

### 1.1. Description

Digital methods of engineering informatics are becoming increasingly important for the planning, control, construction and operation of buildings. In particular, Building Information Modeling (BIM) is the central method for the digitalization of engineering planning, implementation and operation up to the dismantling or demolition of buildings in the sense of urban mining. There are new specialist roles (e.g. BIM Manager, BIM Coordinator), which are in high demand, with the following activities (selection):

- Preparation of Client Information Requests (AEOI)
- Preparation of BIM Project Execution Plans (BAP)
- Creation of 3D models and their visualization for planning, implementation and operation
- Multimodal Digital Feasibility Studies (3D, Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR))
- Integrated building-environment visualizations and information systems for the public
- Coordination of digital project management
- Creation and implementation of project-specific data security concepts
- Planning and operation of intelligent buildings incl. sensor technology
- Digital Engineering Methods for Planning, Execution, and Operations

In addition, there is an increasing demand for computer-based methods of data-driven modeling with machine learning/artificial intelligence based on sensor data from the Internet of Things (IoT).

Especially in statics, glass and façade technology as well as materials technology and building physics in combination with the subject of numerical methods and computer science in construction, competencies in this area are indispensable for future-proof planning, control, construction and operation of buildings.

The relevant computer-based methods, models and processes as well as relevant software tools are taught in their scientific foundations and deepened in exemplary exercises, with the aim of specifying, implementing, visualizing and working on engineering-specific tasks in a computer-oriented manner.

The following recommendations are separated according to the main areas of application engineering informatics, statics, glass and façade technology as well as materials technology and building physics.

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## 1.2. Module Recommendation

### Main focus on Engineering Informatics:

#### Basic Research Modules of 36 CP (12 CP per Research Subject)

Research Subject „Research Subject Numerical Methods and Informatics in Civil Engineering“

- Engineering Informatics I (13-F0-M003), 6 CP
- Engineering Informatics II (13-F0-M004), 6 CP

Research Subject “Structural Analysis”

- Structural Analysis III (13-M2-M003), 6 CP
- Structural Analysis IV (13-M2-M004), 6 CP

Research Subject “Materials Technology and Restoration”

- Bauschäden und Bauwerksanalyse (13-D3-M005), 6 CP
- Special Concretes (13-D3-M004), 6 CP

#### Specialization Research Modules of 12 CP

Research Subject „Research Subject Numerical Methods and Informatics in Civil Engineering“

- Ingenieurgerechte Modellierung und Visualisierung (13-F0-M006), 6 CP
- Managementverfahren im Bau- und Umweltwesen (13-F0-M005), 6 CP

#### Modules of the Subject-Related Elective Area of 36 CP

- Angewandte Baudynamik - Brückendynamik und Verkehrsinduzierte Schwingungen (13-D2-M036), 3 CP
- Computational Methods for Building Physics and Construction Materials (13-D3-M020), 6 CP
- Grundlagen der Baudynamik (13-M2-M023), 3 CP
- Hochleistungssimulationen im Ingenieurwesen (13-F0-M011), 6 CP
- Projekt Gebäudeinformationssystem und Building Information Modeling (13-02-M015), 3 CP
- Umweltinformationssysteme (13-F0-M012), 6 CP
- Einwirkungen auf Tragwerke und Tragwerkszuverlässigkeit (13-M2-M008), 6 CP
- Photogrammetric Computer Vision (13-G0-M006), 3 CP

### Main focus on Structural Analysis:

#### Basic Research Modules of 36 CP (12 CP per Research Subject)

- s.a.

#### Specialization Research Modules of 12 CP

Research Subject “Structural Analysis”

- Finite-Element-Methoden I (13-E1-M001), 6 CP
- Finite-Element-Methoden II (13-E1-M002), 6 CP

#### Modules of the Subject-Related Elective Area of 36 CP

- s.a.

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## **Main focus on Materials Technology and Restoration:**

### **Basic Research Modules of 36 CP (12 CP per Research Subject)**

- s.a.

### **Specialization Research Modules of 12 CP**

Research Subject “Materials Technology and Restoration”

- Building Chemistry (13-D3-M016), 6 CP
- Concrete Durability (13-D3-M006), 6 CP

### **Modules of the Subject-Related Elective Area of 36 CP**

- s.a.

## **Main focus on Glass Structures and Facade Technology:**

### **Basic Research Modules of 36 CP (12 CP per Research Subject)**

Research Subject „Research Subject Numerical Methods and Informatics in Civil Engineering“ (s.a.)

Research Subject “Structural Analysis” (s.a.)

Research Subject „Glass-Structures and Facade Technology“

- Facade Technology I (13-M4-M002), 6 CP
- Facade Technology II (13-M4-M003), 6 CP

### **Specialization Research Modules of 12 CP**

Research Subject „Glass-Structures and Facade Technology“

- Glass und Facade Project (13-M0-M001), 6 CP
- Glass and Polymers I: Glass Structures (13-M3-M003), 6 CP

### **Modules of the Subject-Related Elective Area of 36 CP**

- s.a.

## **1.3. Further information on the job profile**

It is recommended to take the module Image Analysis (13-G0-M012), 3 CP.

## **1.4. Advice on the job profile**

Depending on the main focus, contact persons are

Engineering Informatics: Prof. Dr.-Ing. Uwe Rüppel  
Mail: [rueppel@iib.tu-darmstadt.de](mailto:rueppel@iib.tu-darmstadt.de)

Structural Analysis: Prof. Dr.-Ing. Clemens Hübler  
Mail: [huebler@ismd.tu-darmstadt.de](mailto:huebler@ismd.tu-darmstadt.de)

Materials Technology and Restoration: Prof. Dr.-Ing. Eduardus Koenders  
Mail: [koenders@wib.tu-darmstadt.de](mailto:koenders@wib.tu-darmstadt.de)

Glass Structures and Facade Technology: Prof. Dr.-Ing. Ulrich Knaack  
Mail: [knaack@ismd.tu-darmstadt.de](mailto:knaack@ismd.tu-darmstadt.de)